

WHAT IS CLAIMED IS:

1. A module for determining a driving signal timing for a liquid crystal display (LCD) device, comprising:
 - 5 a flexible base substrate;
 - a gate-driving signal input line formed on one side of the base substrate so that a gate-driving signal is applied to the gate-driving signal input line;
 - a gate-driving IC mounted on the base substrate to be connected to the gate-driving signal input line, the gate driving IC adapted to modify linearly a level of the gate-driving signal inputted to a first gate line through a last gate line
 - 10 of a plurality of gate lines formed on a TFT substrate when allowing the applied gate-driving signal to be diverged in a parallel way so as to input it to the plurality of gate lines, and then, output the linearly modified gate-driving signal through output terminals thereof; and
 - 15 a plurality of gate-driving signal output lines formed on the base substrate in such a manner that the plurality of gate-driving signal output lines are connected to output terminals of the gate driving IC, the plurality of gate-driving signal output lines adapted to allow the gate-driving signal outputted from the output terminals of the gate-driving IC to have a linear level and to be applied to the plurality of gate lines.

2. The module according to claim 1, wherein the output level of the gate-driving signal from the output terminals of the gate-driving IC is sequentially reduced as the output terminal goes from a first output terminal to a last output terminal so that the level of the gate-driving signal from the first

output terminal is the highest, and the level of the gate-driving signal from the last output terminal is the lowest.

3. The module according to claim 2, wherein the gate-driving signal from the output terminals is a turn-off voltage for keeping a thin-film transistor
5 (TFT) for the liquid crystal display (LCD) device turned-off.

4. The module according to claim 1, wherein a signal transmitting line is formed on the base substrate of the gate-driving IC in such a manner that the signal transmitting line is connected to the gate-driving signal input line in parallel, so that the gate-driving signal applied to the gate-driving signal input
10 line is not applied to the gate-driving IC and is bypassed to output it to the outside of the base substrate.

5. The module according to claim 4, wherein the difference between the level of the gate-driving signal from the signal transmitting line and the level of the gate-driving signal from the last output terminal of the output terminals of the
15 gate-driving IC is adjusted to be within a predetermined range.

6. The module according to claim 5, wherein a portion of the signal transmitting line passes through the inside of the gate-driving IC while the level of the gate-driving signal from the signal transmitting line and the level of the gate-driving signal from the last output terminal of the output terminals of the
20 gate-driving IC are within a predetermined range.

7. The module according to claim 5, wherein the level of the gate-driving signal from the signal transmitting line and the level of the gate-driving signal from the last output terminal of the output terminals of the gate-driving IC are within a predetermined range by adjusting an intrinsic resistance

of the signal transmitting line.

8. The module according to claim 1, wherein the base substrate has a signal input line connected to the gate-driving IC and at least one signal transmitting line separated from the signal input line.

5 9. The module according to claim 8, wherein the level of the gate-driving signal from the signal transmitting line and the level of the gate-driving signal from the last output terminal of the output terminals of the gate-driving IC are within a predetermined range.

10 10. A liquid crystal display (LCD) panel assembly, comprising:

an integrated printed circuit board (PCB) adapted to generate a gate-driving signal and a data-driving signal;

a liquid crystal display (LCD) panel including a TFT substrate having a plurality of columns of data lines formed thereon so that the data-driving signal is applied to a plurality of thin-film transistors (TFTs) formed in a matrix form on a transparent substrate, a plurality of rows of gate lines formed thereon so that the gate-driving signal is applied to the plurality of thin-film transistors (TFTs), and pixel electrodes formed thereon so that a certain signal is applied thereto and maintained, the pixel electrode being connected to the plurality of thin-film transistors (TFTs), a color filter substrate having common electrodes opposite to the pixel electrodes and RGB pixels formed thereon, and a liquid crystal material sealed between the color filter substrate and the TFT substrate;

at least one data-driving signal timing module adapted to apply the data-driving signal to the plurality of columns of data lines allocated, at a designated time;

at least one gate-driving signal timing module adapted to apply the gate-driving signal to the plurality of rows of gate lines allocated, at a designated time; and

a signal transmitting means having a first signal transmitting means
5 allowing the gate-driving signal to be applied to the thin-film transistor (TFT) substrate from the integrated printed circuit board (PCB), a second signal transmitting means allowing the gate-driving signal to be applied to the gate-driving signal timing module from the thin-film transistor (TFT) substrate, and a third signal transmitting means allowing the gate-driving signal to be applied to another gate-driving signal timing module adjacent to the gate-driving signal
10 timing module therefrom, the signal transmitting means being adapted to adjust the gate-driving signal from each of the gate-driving signal timing modules in such a manner that the gate-driving signal is modified linearly.

11. The liquid crystal display (LCD) panel assembly module according
15 to claim 10, wherein the first signal transmitting means is a first signal transmitting line formed on the data-driving signal timing module, and is connected at one end to the integrated PCB and is connected at the other end to the second signal transmitting means formed on the TFT substrate.

12. The liquid crystal display (LCD) panel assembly module according
20 to claim 10, wherein the first signal transmitting means is a first signal transmitting line which is formed on a flexible base substrate of the data-driving signal timing module, and is connected at one end to the integrated PCB and is connected at the other end to the second signal transmitting means formed on the TFT substrate.

13. The liquid crystal display (LCD) panel assembly module according to claim 10, wherein the second signal transmitting means is a first signal transmitting pattern formed in such a manner that the second signal transmitting means is formed on the TFT substrate, and is connected at one end to the first signal transmitting means and is connected at the other end to the gate-driving signal timing module at the same time when forming the plurality of columns of data lines and the plurality of rows of gate lines.

14. The liquid crystal display (LCD) panel assembly module according to claim 10, wherein the gate-driving signal timing module comprises:

- 10 a flexible base substrate;
- a gate-driving signal input line formed on one side of the base substrate and adapted to allow the gate-driving signal to be applied thereto through the second signal transmitting means;
- a gate-driving IC mounted on the base substrate, the gate-driving IC having an input terminal to which the gate-driving signal is applied through the gate-driving signal input line, and a plurality of output terminals being adapted to allow an output level of the gate-driving signal from a first output terminal through to a last terminal of the plurality of output terminals to be modified continuously; and
- 20 a plurality of gate-driving signal output lines formed on the base substrate in such a manner that each of the plurality of gate-driving signal output lines is connected at one end to an associated one of the plurality of output terminals of the gate-driving IC and is connected at the other end to an associated one of the plurality of gate lines.

15. The liquid crystal display (LCD) panel assembly module according to claim 14, wherein the output level of the gate-driving signal from the plurality of output terminals is a turn-off voltage reduced sequentially as the output terminal goes from the first output terminal to the last output terminal.

5 16. The liquid crystal display (LCD) panel assembly module according to claim 15, wherein the third signal transmitting means includes:
a third signal transmitting line formed on the base substrate, the third signal transmitting line being connected at one end to the gate-driving signal input line in parallel and being extended and connected at the other end to an edge of the
10 base substrate; and
a second signal transmitting pattern formed on the TFT substrate, the second signal transmitting pattern being connected at one end to the third signal transmitting line and being connected at the other end to a first signal transmitting line of the next gate-driving signal timing module.

15 17. The liquid crystal display (LCD) panel assembly module according to claim 16, wherein the third signal transmitting line and the second signal transmitting pattern adjust the level of an output signal from the third signal transmitting line and the second signal transmitting pattern and the level of an output signal from the last output terminal of the output terminals of the gate-
20 driving IC so that the levels are within a predetermined range.

18. The liquid crystal display (LCD) panel assembly module according to claim 16, wherein the levels of the output signal are adjusted by an intrinsic resistance of the gate-driving IC while a portion of the third signal transmitting line passes through the inside of the gate-driving IC.

19. The liquid crystal display (LCD) panel assembly module according to claim 16, wherein the levels of the output signal are adjusted by controlling an intrinsic resistance of the third signal transmitting line when forming the third signal transmitting line.

5 20. The liquid crystal display (LCD) panel assembly module according to claim 16, wherein the levels of the output signal are adjusted by controlling an intrinsic resistance of the second signal transmitting pattern when forming the second signal transmitting pattern.

10 21. The liquid crystal display (LCD) panel assembly module according to claim 16, wherein the levels of the output signal are adjusted by controlling an intrinsic resistance of the third signal transmitting line and the second signal transmitting pattern when forming the third signal transmitting line and the second signal transmitting pattern.

15 22. A method for driving a liquid crystal display (LCD) panel assembly, comprising the steps of:

applying a gate-driving signal generated from an integrated printed circuit board (PCB) to a plurality of gate lines formed on a liquid crystal display (LCD) panel so that a level of a turn-off signal for maintaining a thin-film transistor (TFT) formed on the liquid crystal display (LCD) panel in a turned-off state among the applied gate-driving signal is modified linearly as the gate line goes from a first gate line to a last gate line of the plurality of gate lines;

20 applying a corresponding data-driving signal generated from the integrated printed circuit board (PCB) to a plurality of data lines formed on the liquid crystal display (LCD) panel; and

selecting any one of the plurality of gate lines, and then applying a turn-on signal generated from the integrated printed circuit board (PCB) to the selected gate line for a predetermined period of time.